

## CLAIMS

1. An LED illumination source device for use in a flow particle detection device comprising:

an LED for providing light at a selected wavelength; and  
an optical element for collecting nearly all of the light from the  
LED and concentrating the collected light at a selected  
volume within a flow sample stream.

2. The device of claim 1, wherein the optical element comprises: a  
collecting element having a small focal length for collecting the light  
from the LED and substantially collimating it to a roughly parallel  
beam of light; and  
a focussing element for focussing the collimated beam.

3. The device of claim 1 wherein the collecting element is a ball lens.

4. The device of claim 1 wherein the LED is a composite LED which  
generates light at two wavelengths.

5. The device of claim 1 wherein the LED is a side emitting, flat  
pack, lenseless LED.

6. The device of claim 1 wherein the flow particle detection device  
is a flow cytometer.

7. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;  
an illumination device for illuminating the sample stream within  
the flow zone; and

a detector assembly for detecting light emitted or scattered  
from illuminated target particles within the flow zone;  
wherein the illumination device includes an LED illumination source  
device including -

an LED for providing light at a selected wavelength; and  
an optical element for collecting nearly all of the light from  
the LED and concentrating the collected light at a  
selected volume within a flow sample stream.

8. The apparatus of claim 7 wherein the optical element comprises:  
a collecting element having a small focal length for collecting  
nearly all of the light from the LED and substantially  
collimating it to a parallel beam of light; and  
a focussing element for focussing the collimated beam.

9. The apparatus of claim 8 wherein the collecting element is a ball lens.

10. The apparatus of claim 7 wherein the LED is a composite LED which generates light at two wavelengths.

11. The apparatus of claim 10 wherein the detector detects light



14. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

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an illumination device for illuminating the sample stream within

the flow zone with two selected wavelengths; and

a detector assembly for detecting light emitted or scattered

from illuminated target particles resulting from illumination

at both selected wavelengths within the flow zone;

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wherein the illumination device includes an LED illumination source

device including -

an LED for providing light at the two selected

wavelengths; and

an optical element for collecting nearly all of the light

from the

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LED and concentrating the collected light

at a selected volume within a flow sample

stream.

15. The apparatus of claim 14, wherein the detector assembly comprises two detectors for detecting emitted light at two wavelengths.

16. The apparatus of claim 14, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

17. The apparatus of claim 16, wherein the detector assembly comprises two detectors for detecting emitted light at the two wavelengths.

18. The apparatus of claim 14 wherein the optical element comprises:

a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a roughly parallel beam of light; and  
a focussing element for focussing the collimated beam.

19. The apparatus of claim 18 wherein the collecting element is a ball lens.

20. The apparatus of claim 14 wherein the particle detection apparatus is a flow cytometer.